## **Communications** in Computer and Information Science

929

Commenced Publication in 2007 Founding and Former Series Editors: Phoebe Chen, Alfredo Cuzzocrea, Xiaoyong Du, Orhun Kara, Ting Liu, Dominik Ślęzak, and Xiaokang Yang

#### **Editorial Board**

Simone Diniz Junqueira Barbosa

Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Rio de Janeiro, Brazil

Joaquim Filipe

Polytechnic Institute of Setúbal, Setúbal, Portugal

Igor Kotenko

St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences, St. Petersburg, Russia

Krishna M. Sivalingam

Indian Institute of Technology Madras, Chennai, India

Takashi Washio

Osaka University, Osaka, Japan

Junsong Yuan

University at Buffalo, The State University of New York, Buffalo, USA

Lizhu Zhou

Tsinghua University, Beijing, China

More information about this series at http://www.springer.com/series/7899

El Hassan Abdelwahed · Ladjel Bellatreche Djamal Benslimane · Matteo Golfarelli Stéphane Jean · Dominique Mery Kazumi Nakamatsu · Carlos Ordonez (Eds.)

# New Trends in Model and Data Engineering

MEDI 2018 International Workshops DETECT, MEDI4SG, IWCFS, REMEDY Marrakesh, Morocco, October 24–26, 2018 Proceedings



Editors
El Hassan Abdelwahed
Cadi Ayyad University
Marrakesh, Morocco

Ladjel Bellatreche ISAE-ENSMA Chasseneuil-du-Poitou, France

Djamal Benslimane 
LIRIS Lab
University Lyon 1, IUT
Villeurbanne Cedex, France

Matteo Golfarelli Computer Science and Information Technology University of Bologna Cesena, Italy Stéphane Jean ISAE-ENSMA

Chasseneuil-du-Poitou, France

Dominique Mery LORIA Nancy, France

Kazumi Nakamatsu University of Hyogo Himeji, Japan

Carlos Ordonez University of Houston Houston, TX, USA

ISSN 1865-0929 ISSN 1865-0937 (electronic)
Communications in Computer and Information Science
ISBN 978-3-030-02851-0 ISBN 978-3-030-02852-7 (eBook)
https://doi.org/10.1007/978-3-030-02852-7

Library of Congress Control Number: 2018958519

#### © Springer Nature Switzerland AG 2018

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

#### **Preface**

This volume presents the proceedings of the scientific workshops that were held in conjunction with the 8th International Conference on Model and Data Engineering (MEDI 2018), which took place in Marrakech, Morocco, October 24–26, 2018.

Four workshops were selected on a wide range of topics that fall into the main area of the MEDI 2018 conference:

- The Model and Data Engineering for Social Good Workshop (MEDI4SG 2018)
- The International Workshop on Modeling, Verification, and Testing of Dependable Critical Systems (DETECT 2018)
- The Second International Workshop on Cybersecurity and Functional Safety in Cyber-Physical Systems (IWCFS 2018)
- The International Workshop: Formal Model for Multifaceted Systems (REMEDY)

Workshop proposals were submitted and the selection of appropriate workshops was carried out by Djamal Benslimane, Jean Stéphane, and Kazumi Nakamatsu. Each selected workshop was managed by its chairs and had its own Program Committee. An introduction to the selected workshops is presented in the next pages.

We would like to thank the workshop chairs for their nice work and the Program Committee members of the different selected workshops for their contribution to evaluating submitted papers.

For readers of this volume, we hope you will find it both interesting and informative. We also hope it will inspire and embolden you to greater achievements and to look further into the challenges that still lie ahead in our digital society.

October 2018

El Hassan Abdelwahed Ladjel Bellatreche Djamal Benslimane Matteo Golfarelli Stéphane Jean Dominique Mery Kazumi Nakamatsu Carlos Ordonez

### **Contents**

DETECT 2018 Workshop	
Steady-State Performability Analysis of Call Admission Control in Cellular Mobile Networks	5
An MDA Approach for the Specification of Relay-Based Diagrams Dalay Israel de Almeida Pereira, Ouahmed Malki, Philippe Bon, Matthieu Perin, and Simon Collart-Dutilleul	17
A Problem-Oriented Approach to Critical System Design and Diagnosis Support	30
Formal Specification and Verification of Cloud Resource Allocation Using Timed Petri-Nets	40
Petri Nets to Event-B: Handling Mathematical Sequences Through an ERTMS L3 Case	50
Model-Based Verification and Testing Methodology for Safety-Critical Airborne Systems	63
MEDI4SG 2018 Workshop	
Gamification and Serious Games Based Learning for Early Childhood in Rural Areas	79
Context-Based Sentiment Analysis: A Survey	91

Oumayma El Ansari, Jihad Zahir, and Hajar Mousannif

A Multi-agent System-Based Distributed Intrusion Detection System	00
for a Cloud Computing	98
IWCFS 2018 Workshop	
Invited Talk: A Roadmap for Engineering Safe and Secure Cyber-Physical Systems	113
Towards a Requirements Engineering Approach for Capturing Uncertainty in Cyber-Physical Systems Environment	115
Assessment of Emerging Standards for Safety and Security Co-Design on a Railway Case Study	130
Generation of Behavior-Driven Development C++ Tests from Abstract State Machine Scenarios	146
Hybrid Systems and Event-B: A Formal Approach to Signalised Left-Turn Assist	153
Handling Reparation in Incremental Construction of Realizable  Conversation Protocols	159
Analyzing a ROS Based Architecture for Its Cross Reuse in ISO26262 Settings	167
REMEDY 2018 Workshop	
Reliability in Fully Probabilistic Event-B: How to Bound the Enabling	
of Events	185

	Contents	IX
Systematic Construction of Critical Embedded Systems Using Even Pascal André, Christian Attiogbé, and Arnaud Lanoix	ıt-B	200
Component Design and Adaptation Based on Behavioral Contracts Samir Chouali, Sebti Mouelhi, and Hassan Mountassir		217
Towards Real-Time Semantics for a Distributed Event-Based MOP Language		231
Short Paper		
Automatic Planning: From Event-B to PDDL		247
Author Index		255